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**Ticona** RECEIVE

March 5, 2012  
EIJ-020-12  
TPI Project – 07082011-MISC

MAR -7 2012

Bishop Facility  
Highway 77 South  
P.O. Box 429  
Bishop, TX 78343

Air/Toxics & Inspection  
Coordination Branch  
6EN-A

Mr. David Eppler  
Air Toxics and Inspection Coordination Branch  
U.S.EPA Region 6  
1445 Ross Avenue  
Dallas, TX 75202-2733

Subject: **Clean Air Act ("CAA") Section 114 Information Request –  
Supplemental Monthly Response**

Dear Mr. Eppler,

As follow up to our meeting on December 20, 2011 and agreement to submit periodic progress reports, Ticona Polymers, Inc. (Ticona) is submitting the following information relating to the EPA's Section 114 Information Request. The team continues to work diligently on this project and will provide the next update to you by March 26, 2012.

#### **MO3/MO4 Flares**

As previously stated in our January 15<sup>th</sup> submittal, a Ticona team consisting of process control, project, production, process safety and environmental engineers has been evaluating options to address the Btu value issues.

As reported earlier the two options being assessed are: 1) adding Natural gas to increase the heating value or 2) using a molecular seal to prevent flashback if the center steam is discontinued.

Additionally, a new option is being analyzed: 3) adding steam before the flare in order to satisfy non-steam assisted criteria.

1. After discussions with John Zink the option of implementing a molecular seal to prevent flashback was ruled out due to process safety considerations.
2. Addition of Natural gas to reach the desired net heating value is still currently being pursued. Callidus Technologies responded to our numerous requests with calculated values. The analysis shows that the evaluations done by the Ticona Polymers Process Engineer matched Callidus's evaluation for the MOIV flare, with some variation. However, there is a discrepancy with the MOIII evaluation between the two parties. The Process Engineer emailed various questions to Callidus to clarify the difference in the calculations for the MOIII flare. The Callidus response was vague and to-date has not clarified any of the variation.

**Celanese**

Ticona  
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- Following the 2/9/12 Callidus response, a phone meeting was scheduled between the two parties in order to achieve a better understanding of their response. Unfortunately, this meeting was later canceled by Callidus.
  - Ticona Polymers has attempted to reschedule with Callidus to collaborate on understanding the variations, but this effort has been unsuccessful to-date.
3. A new option that is being analyzed that adds steam before the flare to ensure safe operation. Due to the operating temperature of the process vent gas and the natural gas temperature, there is a concern of condensation of steam within the flare. The safety and technical viability of this potential solution is currently being evaluated.

While waiting for responses from Callidus, Ticona Polymers contacted John Zink Co. on 2/28/12 to assist in the evaluations. The John Zink Co. representative is Mr. Jim Franklin, who is very familiar with flare operations. He was associated with the TCEQ / University of Texas flare studies, and is very familiar with the safety and operational considerations for meeting 40 CFR 60.18. We are currently awaiting a response from Mr. Franklin.

To Summarize, the following actions have been done or are currently in progress:

- Persistent communication attempts to Callidus by Ticona Polymers.
- Process Engineer has reevaluated the flare calculations after receiving Callidus calculations
- Identified discrepancy between the Callidus & Ticona Polymers calculations
- Currently evaluating data with adjusted vent gas flow rates of the current vent gas flow meter.
- Evaluating new option of eliminating the addition of steam directly in the flare and adding it earlier in the process. (Amount of steam required in order to prevent condensation within the flare and deliver safe operation)
- Started parallel conversation with John Zink Co.

The following validations cannot be made until the flare manufacturer's design criteria has been verified, including the calculation assumptions and actual data for flare design:

- Is the current flare design adequate for the required increase in natural gas?
- On what basis does Callidus utilize 0.12 value for fraction of heat radiated in calculating the height of the flare?
- Clarification on why they do not use the steam flow in calculating the overall net heating value even though the flare is deemed steam assisted?

Should you have any questions or need additional information, please contact me at (361) 584-6104.

Sincerely,



Buddy Joyner by  
Amanda Black  
Sr. Environmental Specialist II

Enclosed: Email chain of events between Ticona and Callidus

**Ticona Polymers, Inc. Initial Email assistance request to Callidus Technologies:**

**From:** Patel, Samyak, Ticona/US [<mailto:samyak.patel@ticona.com>]  
**Sent:** Friday, February 03, 2012 8:16 AM  
**To:** Settles, Aaron  
**Cc:** Joyner, Edward (Buddy), Celanese/US  
**Subject:** Update!

Aaron,

I was wondering if you can give me an update on where we stand with the flare calculations. This information will help us in submitting a report to the EPA regarding our progress to satisfy the requirement. Also, I was wondering if you can send me your calculations for the required natural gas numbers. I want to compare our calculation method and see why our numbers vary a little. Thank you for your time.

Regards,



Celanese, Ltd.  
Process Engineer – Bishop Facility  
Phone: (361)-584-6131

**Callidus Technologies Reply:**

**From:** Settles, Aaron [<mailto:Aaron.Settles@Honeywell.com>]  
**Sent:** Saturday, February 04, 2012 1:45 PM  
**To:** Patel, Samyak, Ticona/US  
**Cc:** Joyner, Edward (Buddy), Celanese/US  
**Subject:** RE: Update!

Mr. Patel,

I am still working to finalize the calculations on the other items besides the assist gas as discussed. Please excuse the delay, as I have been in and out of the office all week. Regarding the calculations that I already sent – essentially how we calculate does not take into account the steam assist nature of the flare tip. While this is important for determining a viable heating value of the process gas, it does not affect further calculations. As such, what we did was take the process data of the streams that you supplied to us and add in enough of the fuel gas (also supplied by you) until we reached the desired 300 btu/scf heating values. The only immediate



place where I would assume a possible deviation would be that we used mol fractions (that is if you happened to use mass fractions). Anyway, please let me know if this clears things up, or if you have further questions. Also, please know that I have not forgotten about the other calculations and should have them to you some time during the beginning of this next week.

Regards,

**Aaron Settles**

Combustion Engineer - Flares Group  
Callidus Technologies by Honeywell  
Office - (918) 523-2112

**Callidus Technologies reply**

From: Settles, Aaron [<mailto:Aaron.Settles@Honeywell.com>]  
Sent: Thursday, February 09, 2012 5:21 PM  
To: Patel, Samyak, Ticona/US  
Subject: Re: Update!

Mr. Patel,

With the addition of the assist gas, the pressures and exit velocities are below:

<b>MOIV</b>	<b>MOIII</b>
4.086 in WC	12.497 in WC
65.5 ft/s	62.4 ft/s

Additionally, I have included radiation plots. These also include the added assist gas. Let me know if you have any further questions.

Thanks,

**Aaron Settles**

Combustion Engineer - Flares Group  
Callidus Technologies by Honeywell  
Office - (918) 523-2112

**Ticona Polymers, Inc.**

**From:** Patel, Samyak, Ticona/US [<mailto:samyak.patel@ticona.com>]  
**Sent:** Monday, February 13, 2012 2:30 PM  
**To:** Settles, Aaron  
**Cc:** Joyner, Edward (Buddy), Celanese/US  
**Subject:** Questions and Concerns

Aaron,

Thank you very much for sending me those calculation. Your work has helped me in better assess the situation we are facing today.

I have reviewed the numbers you have sent me and I have some questions for you.

1. Why do you not consider the center steam when calculating the net heating value? (As you may know EPA has concluded our flare to be steam assisted due to center steam.

Maybe you can explain to me why you do not include the center steam in your calculation because that is the battle we are fighting. We need to figure out a way of reaching 300 btu/scf with the center steam. Unless, you know something that lets you exclude the center steam, if that is the case then please help me clear up this misunderstanding because according to my knowledge you have to include the center steam flow due to the flare being considered as steam assisted.)

2. The following equation, Hajek and Ludwig, is what I used to calculate the height of the stack; given the vent gas flow and natural gas flow.

$$D = \sqrt{((\text{tao}) * F * Q) / (4 * \pi * K)}$$

Where:

D = minimum distance from the midpoint of the flame to the object being considered

Tao = fraction of heat intensity transmitted

F = fraction of heat radiated

Q = heat release (lower heating value), in British thermal units per hour (kilowatts)

K = allowable radiation, in British thermal units per hour per square foot (kilowatts per square meter) (500 BTU/hr-ft<sup>2</sup>)

So, my question is what value did you use for "F = Fraction of heat radiated" and "tao = fraction of heat intensity transmitter in order to calculate the height of the stack and why?

3. Is the currently designed flare capable of safely operating with fuel gas rates doubled?
4. Is all steam not accounted for or just steam ring? (Our flares have center steam and not steam ring.)

Furthermore, for the MOIV flare our numbers for required natural gas to reach 300 btu/scf are in the same ball park when I calculate with no steam and when I include steam I get higher required natural gas flow (which is understandable). For MOIII our numbers differ and I am not able to pin point what I did differently; without steam the required natural gas flow I get is 265,000 SCFH and with steam I get 290,000 SCFH. Please help me clarify this difference in our results.

It would be of great help if you can answer these questions for me! I really appreciate your efforts in helping us find a solution to this problem. Thank you once again!

Regards,

*Samyak Patel*

Celanese, Ltd.

Process Engineer – Bishop Facility

Phone: (361)-584-6131

### **Callidus Technologies reply**

**From:** Settles, Aaron [<mailto:Aaron.Settles@Honeywell.com>]

**Sent:** Tuesday, February 21, 2012 4:22 PM

**To:** Patel, Samyak, Ticona/US

**Cc:** Joyner, Edward (Buddy), Celanese/US

**Subject:** RE: Questions and Concerns

Mr. Patel,

Please accept my apologies for the delay, but I believe that I have some answers for you.

1. It is not necessary to consider the center steam of the tip when calculating the heating value. I understand that the EPA has deemed your flare to be steam assisted. According



to our process team here at Callidus, it is industry standard to handle the assist gas in the manner that I did. Essentially, I took the basic flow (without any H2O vapor) and calculated what assist would be necessary to get this flow up to the 300 btu/scf. The "steam assisted" designation merely dictates the net heating value required as well as the 40cfr exit velocity. If you were to actually consider the steam from the center steam as part of the overall flow, the calculations become much more complex. If you wish to purchase an engineering study these can be performed. However, as I mentioned before, the method that I have used is industry standard.

2. I used the API 521 Simple method of calculation. This provides me with a tao value of 1. The F value used is .12 which has been determined through various in-house testing.
3. I'm inclined to immediately say no. However, this depends on a few factors. The main factor is whether or not you are required to comply to 40cfr.
4. No steam assist is accounted for when calculating gas assist.

Regards,

**Aaron Settles**

Combustion Engineer - Flares Group  
Callidus Technologies by Honeywell  
Office - (918) 523-2112

**Ticona Polymers, Inc.**

**From:** Patel, Samyak, Ticona/US [<mailto:samyak.patel@ticona.com>]

**Sent:** Wednesday, February 22, 2012 2:03 PM

**To:** Settles, Aaron

**Subject:** RE: Questions and Concerns

Aaron,

Thank you very much for answering my questions. I had couple of more small questions here and there, so I was wondering if we can set up a meeting over the phone for anytime that fits your schedule tomorrow? I believe it would be of great benefit to me if we can discuss my concerns over the phone. Please give me a time and a phone number I can reach you at tomorrow, if this is okay with you. Thank you for your time!

Regards,

Samyak Patel

**Callidus Technologies reply**

**From:** Settles, Aaron [<mailto:Aaron.Settles@Honeywell.com>]

**Sent:** Thursday, February 23, 2012 5:14 PM

**To:** Patel, Samyak, Ticona/US

**Subject:** RE: Questions and Concerns

Samyak,

Unfortunately I did not see this email until just now. I will not be in the office until next Tuesday (2/28) so it might be better if you just go ahead and email me your further questions. However, if you prefer to speak over the phone, then around 3:00 pm on Tue would work well for me.

Regards,

**Aaron Settles**

Combustion Engineer - Flares Group Callidus Technologies by Honeywell  
Office - (918) 523-2112